4.5 Geology, Soils and Seismicity

4.5.1 Environmental Setting

PHYSICAL SETTING

Regional Geology

The San Francisco Peninsula is at the north end of the Santa Cruz Mountains, one of several coastal ranges in California. In the San Francisco Bay Area region, most of the mountains and ridges are formed on a basement of Cretaceous- and Jurassic-age (70- to 200-million years old) rocks of the Franciscan Complex, layers of sedimentary and volcanic rocks, and deposits from the last million years at the surface.

Soil Properties

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) (formerly known as the Soil Conservation Service) has mapped soils in the Planning Area in a soil survey for San Mateo County. Soils are characterized according to various properties and grouped into soil associations. The soils within the Planning Area include Fagan Loam, Los Gatos Loam, Maymen Gravelly Loam, Novato Clay, Orthents Cut and Fill, and Orthents Cut and Fill–Urban Land complex. The Orthents and Urban Land complex soils in the Planning Area are often located in slopes of 5 to 75 percent west of El Camino Real and in slopes of 0 to 5 percent east of El Camino Real. Less common than the Orthents and Urban Land complex soils, the Fagan Loam soil is located in slopes of 15 to 50 percent, the Los Gatos Loam in 30 to 75 percent slopes, and Maymen gravelly loam in slopes of 30 to 50 percent. These loam soils are found throughout the Planning Area, east of El Camino Real. Novato Clay is found west of Highway 101, in 0 to 1 percent slopes. Soils found in developed areas have generally been reworked to the point that most of the native soils are only found at depth, if at all. Soil properties have a significant bearing on land planning and development. The type of soil will affect liquefaction, shrink swell potential, and landslide potential.

Liquefaction

Liquefaction is a process in which uniform, clean, loose, fine sandy, and silty sediments below the water table temporarily lose strength during an earthquake and behave as a viscous liquid rather than a solid. Liquefaction is restricted to certain geologic and hydrologic environments, primarily recently deposited sand and silt in areas with high groundwater levels. Generally, the younger and looser the sediment, and the higher the water table, the more susceptible the soil is to liquefaction. Sediments most susceptible to liquefaction include Holocene (less than 10,000-year-old) delta, river channel, flood plain, aeolian deposits, and poorly compacted fills. Dense soils, including well-compacted fills, have low susceptibility to liquefaction.

Liquefaction can cause the soil beneath a structure to lose strength, which may result in the loss of foundation-bearing capacity. This loss of strength commonly causes the structure to settle or tip. Loss of bearing strength can also cause light buildings with basements, buried tanks, and foundation piles to rise buoyantly through the liquefied soil.

As shown in Figures 4.5-1 and 4.5-2, portions of the Planning Area and the BVSP Area are at risk of liquefaction. Almost all of the area east of U.S. Highway 101 and some land west of U.S. Highway 101 along Chesterton Avenue is at risk of liquefaction due to the presence of soils that are often saturated or characteristic of wetlands. This area is developed with residential, commercial, and recreational uses. In addition, limited areas along the Belmont Creek are at risk. Most of this more limited area is located in Twin Peaks Park, but the western end of the risk area includes the Carlmont Village Shopping Center.

Subsidence

Subsidence or settlement can occur from immediate settlement, consolidation, shrinkage of expansive soil, and liquefaction. Immediate settlement occurs when a load from a structure or placement of new fill material is applied, causing distortion in the underlying materials. This settlement occurs quickly and is typically complete after placement of the final load. Consolidation settlement occurs in saturated clay from the volume change caused by squeezing out water from the pore spaces. Consolidation occurs over a period of time and is followed by secondary compression, which is a continued change in void ratio under the continued application of the load.

Soils tend to settle at different rates and by varying amounts depending on the load weight or changes in properties over an area, which is referred to as differential settlement. Areas underlain by soft sediments or undocumented fills are most prone to settlement.

Soil Erosion

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, and the action of waves, wind and underground water. Excessive soil erosion can eventually lead to damage of building foundations and roadways. In the Planning Area, areas that are susceptible to erosion as a result of the Proposed Project are those that would be exposed during construction and along the shoreline where soil is subjected to wave action. Typically, the soil erosion potential is reduced once the soil is graded and covered with concrete, structures, asphalt, or slope protection.

Landslides

Landslides, also referred to as slope failures, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake or over-saturation) forces. Exposed rock slopes may undergo rockfalls, rockslides, or rock avalanches, while soil slopes may experience shallow soil slides, rapid debris flows, and deep-seated rotational slides. Landslide-susceptible areas are characterized by steep slopes, downslope creep of surface materials, and unstable soil conditions. In Belmont, this hazard is primarily located in various areas of northwest Belmont, but there is one large hazard area in southeast Belmont in the Sunnyslope neighborhood, as shown in Figure 4.5-1. Landslides may occur on slopes of 15 percent or less, but the probability is greater on steeper slopes. Above 30 percent, conventional single pad type construction is unsuitable, and construction requires substantial grading and retaining walls. Slopes in Belmont that are greater than 30 percent are also shown on Figure 4.5-1 and are primarily located in the western area of the city, especially in the Western Hills and San Juan Hills plan areas. Within the BVSP Area, the southwestern edge along Sixth Avenue and Hill Street is adjacent to areas outside of the BVSP Area with slopes of over 30 percent and includes areas of high landslide risk, as shown in Figure 4.5-2.

Expansive Soils

Certain types of soil are inherently expansive, meaning they can expand and contract as the water content fluctuates within the soil. This expansion and contraction, also called "shrink-swell," can damage structures that are not appropriately engineered for this activity. The U.S. Department of Agriculture (USDA) analyzes the shrink-swell potential of each soil type, and categorizes it as "low," "moderate," "high," or "very high." Where the shrink-swell classification is moderate to very high, shrinking and swelling can damage buildings, roads and other structures.[1] As shown in Figure 4.5-1, some areas of soil with moderate to high shrink-swell potential are scattered throughout the Planning Area.

Regional Faults

The San Francisco Bay Area is one of the most seismically active regions of the United States. There are approximately 30 known faults in the Bay Area that are considered capable of generating earthquakes. A major earthquake is the worst expected hazard in the Planning Area. While there are no active fault lines within the Planning Area, the closest fault zone, the San Andreas Fault Zone – Peninsula, is located approximately one mile from the Planning Area's western boundary. The San Andreas Fault Zone is the predominant fault system in California and has generated some of the largest and most destructive earthquakes in history. The San Andreas Fault is designated by the Alquist-Priolo Earthquake Fault Zoning Act (see Regulatory Section below for more details) as an active fault. Another nearby fault designated as active by the Alquist-Priolo Earthquake Fault Zoning Act is the Hayward Fault, approximately four miles from the Planning Area's eastern boundary. See Figure 4.5-3 for an overview of the region showing the Planning Area, the San Andreas and Hayward Faults, and other faults in the region. More details about both faults are provided below.

San Andreas Fault

The San Andreas Fault Zone is a major structural feature that forms at the boundary between the North American and Pacific tectonic plates, extending from the Salton Sea in Southern California near the border with Mexico to north of Point Arena, where the fault trace extends out into the Pacific Ocean. The main trace of the San Andreas Fault through the San Francisco Bay Area trends northwest through the Santa Cruz Mountains and the eastern side of the San Francisco Peninsula. As the principal strike-slip boundary between the Pacific plate to the west and the North American plate to the east, the San Andreas is often a highly visible topographic feature, such as between Pacifica and San Mateo, where Crystal Springs Reservoir and San Andreas Lake clearly mark the

[1] USDA (U.S. Department of Agriculture). 2012. *National Soil Survey Handbook*. Part 618, Soil Properties and Qualities, Definition and Purpose (618.00). Accessed September 25, 2012. http://soils.usda.gov/technical/handbook/contents/part618.html#38.

rupture zone. Near San Francisco, the San Andreas Fault trace is located immediately off-shore near Daly City and continues northwest through the Pacific Ocean approximately six miles due west of the Golden Gate Bridge.

In the San Francisco Bay Area, the San Andreas Fault Zone was the source of the two most recent major seismic events that affected the San Francisco Bay region. The 1906 San Francisco earthquake was estimated at magnitude (M) 7.9 and resulted in approximately 290 miles of surface fault rupture, the longest of any known continental strike slip fault. Horizontal displacement along the fault approached 17 feet near the epicenter. The more recent 1989 Loma Prieta earthquake, with a moment magnitude (Mw) of 6.9, resulted in widespread damage throughout the Bay Area.

Hayward Fault

The Hayward Fault Zone is the southern extension of a fracture zone that includes the Rodgers Creek Fault (north of San Pablo Bay), the Healdsburg fault (Sonoma County), and the Maacama fault (Mendocino County). The Hayward fault trends to the northwest within the East Bay, extending from San Pablo Bay in Richmond, 60 miles south to San Jose. The Hayward fault in San Jose converges with the Calaveras fault, a similar type fault that extends north to Suisun Bay.

Historically, the Hayward fault generated one sizable earthquake in the 1800s.[2] In 1868, a M 7 earthquake on the southern segment of the Hayward Fault ruptured the ground for a distance of about 30 miles. Recent analysis of geodetic data indicates surface deformation may have extended as far north as Berkeley. Lateral ground surface displacement during these events was at least 3 feet.

A characteristic feature of the Hayward fault is its well-expressed and relatively consistent fault creep. Although large earthquakes on the Hayward fault have been rare since 1868, slow fault creep has continued to occur and has caused measurable offset. Fault creep on the East Bay segment of the Hayward fault is estimated at 9 millimeters per year (mm/yr).[3] However, a large earthquake could occur on the Hayward fault with an estimated Mw of about 7.1. The US Geological Survey (USGS) Working Group on California Earthquake Probabilities includes the Hayward–Rodgers Creek Fault Systems in the list of those faults that have the highest probability of generating earthquakes of M 6.7 or greater in the Bay Area.[4]

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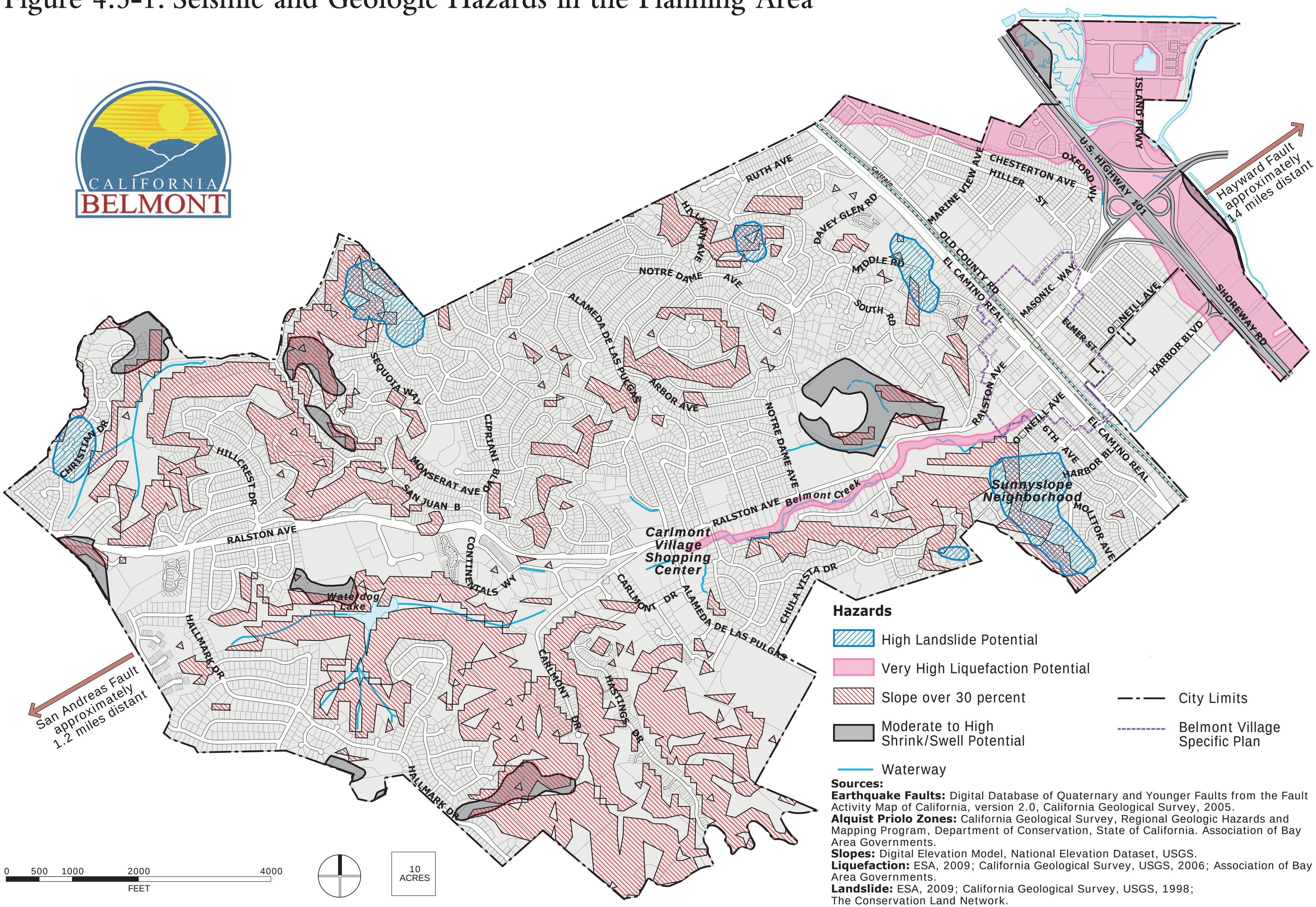
2 Prior to the early 1990s, it was thought that an M 7 earthquake occurred on the northern section of the Hayward Fault in 1836. However, a study of historical documents by the California Geological Survey concluded that the 1836 earthquake was not on the Hayward Fault (Bryant, Bryant, W.A., and Cluett, S.E., compilers, Fault number 55a, Hayward fault zone, Northern Hayward section, in Quaternary fault and fold database of the United States, ver 1.0: U.S. Geological Survey Open-File Report 03-417, http://geohazards.usgs.gov/cfusion/qfault/qf_web_disp.cfm?qfault_or=1319&ims_cf_cd=cf&disp_cd=C, 2000).

3 Peterson, M.D., W.A. Bryant, and C.H. Cramer. Probabilistic Seismic Hazard Assessment for the State of California, California Division of Mines and Geology Open-File Report issued jointly with U.S. Geological Survey, CDMG 96-08 and USGS 96–706, 1996.

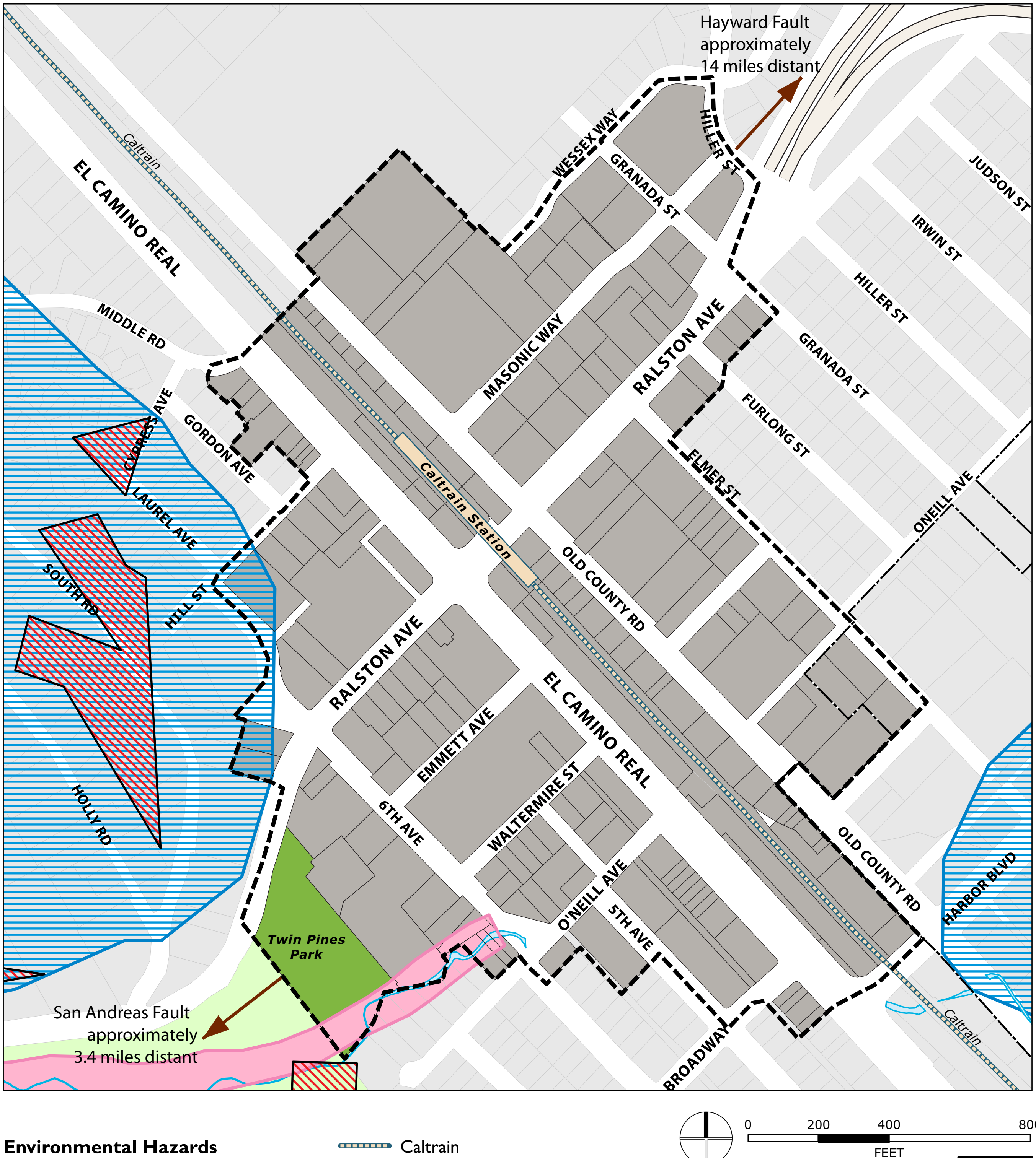
4 USGS, 2003.

Figure 4.5-1: Seismic and Geologic Hazards in the Planning Area



Sources:
Earthquake Faults: Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, version 2.0, California Geological Survey, 2005.
Alquist Priolo Zones: California Geological Survey, Regional Geologic Hazards and Mapping Program, Department of Conservation, State of California. Association of Bay Area Governments.
Slopes: Digital Elevation Model, National Elevation Dataset, USGS.
Liquefaction: ESA, 2009; California Geological Survey, USGS, 2006; Association of Bay Area Governments.
Landslide: ESA, 2009; California Geological Survey, USGS, 1998; The Conservation Land Network.
Soils: Soil Survey, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey.

Figure 4.5-2: Seismic and Geologic Hazards in the BVSP Area



Environmental Hazards

- Very High Liquefaction
- High Landslide Risk
- Slope over 30 percent
- Caltrain
- Waterway
- Study Area Parcels
- Belmont Village Planning Area
- City of Belmont

Source: California Geological Survey, 2006; National Elevation Dataset, USGS 2015; The Bay Area Conservation Land Network, 2015; Association of Bay Area Governments, 2015; FEMA, 2016; City of Belmont, 2015; Dyett & Bhatia, 2016.

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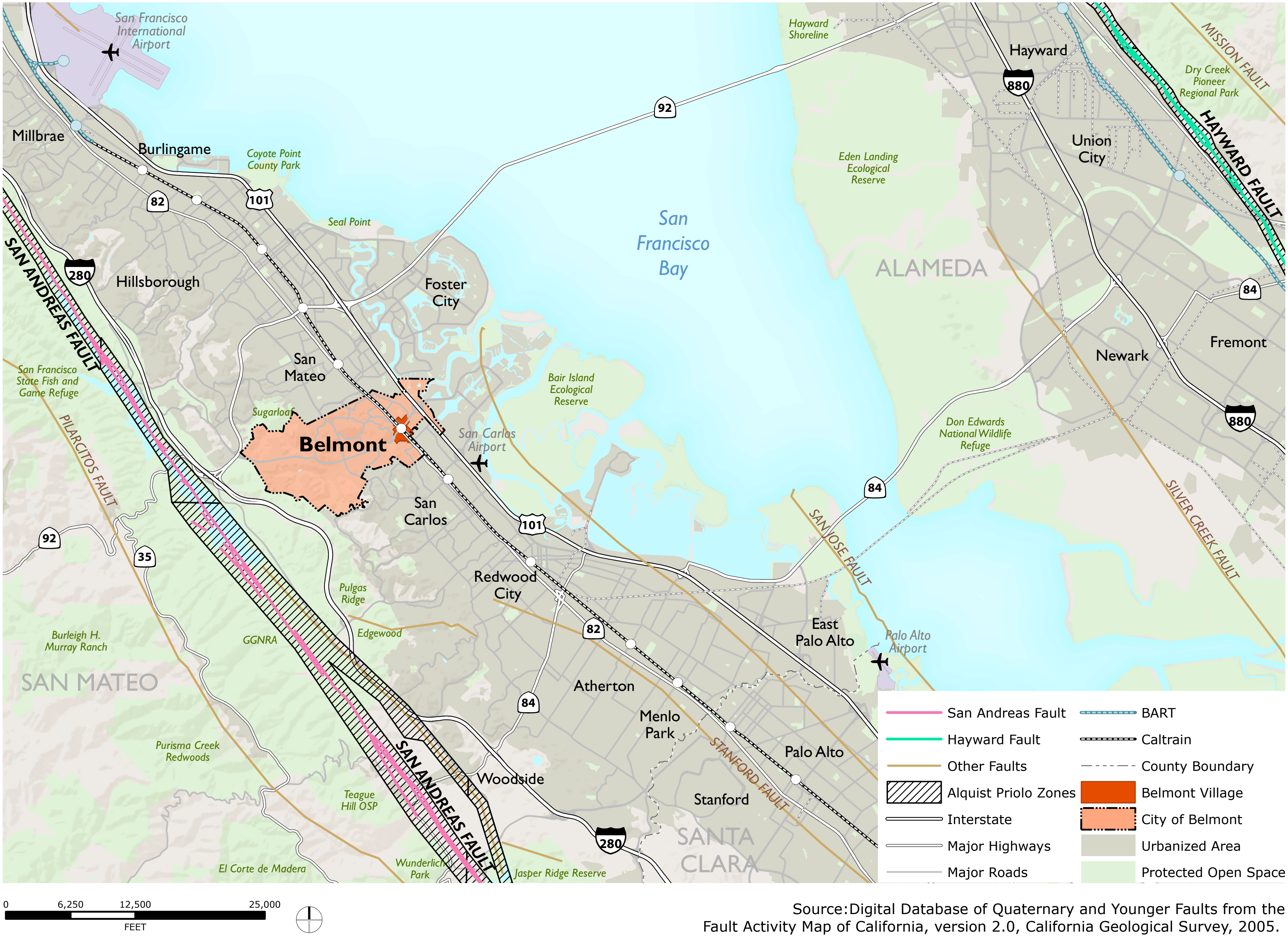
Figure 4.5-3: Regional Earthquake Faults



Source:Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, version 2.0, California Geological Survey, 2005.

Table 4.5-1: Modified Mercalli Intensity Scale

	Intensity Description	*Average Peak Acceleration*[1]
I	Not felt except by a very few persons under especially favorable circumstances.	<0.0017g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	<0.014g
III	Felt quite noticeably indoors, especially on upper floors of buildings, but many persons do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to a passing of a truck.	<0.014g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	0.014g-0.039g
V	Felt by nearly everyone, many awakened. Some dishes, windows, broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.	0.039g-0.092g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.	0.092g-0.18g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	0.18g-0.34g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Persons driving motor cars disturbed.	0.34g-0.65g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.65g-1.24g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes.	> 1.24g
XI	Few, if any, masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24g
XII	Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24g

Note:

1. g (gravity)= 980 centimeters per second squared. Acceleration of 1.0 g is equivalent to a car traveling 328 feet from rest in 4.5 seconds.

Source: USGS. The Severity of an Earthquake. http://www. http://pubs.usgs.gov/gip/earthq4/severitygip.html, January 11, 2013.

Groundshaking

Fault activity has the potential to result in groundshaking, which can be of varying intensity depending on the nature or profile of earthquake activity, proximity to that activity, and local soils and geology conditions. Earthquake damage to structures can be caused by ground rupture, liquefaction, and groundshaking. The level of damage at a location resulting from an earthquake will depend upon the magnitude of the event, the epicenter distance, the response of geologic materials, and the design and construction quality of structures. Groundshaking could bring widespread and serious damage to Belmont.

The Modified Mercalli (MM) intensity scale (see Table 4.5-1) is a common measure of earthquake effects due to groundshaking intensity. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X could cause moderate to significant structural damage.[5] Belmont, as with most regions in San Mateo County, has a MMI (Modified Mercalli Intensity) Shaking Severity Level of 8 (Very Strong).

REGULATORY SETTING

Federal Regulations

U.S. Geological Survey Landslide Hazard Program

The USGS created the Landslide Hazard Program in the mid-1970s; the primary objective of the program is to reduce long-term losses from landslide hazards by improving our understanding of the causes of ground failure and suggesting mitigation strategies. The federal government takes the lead role in funding and conducting this research, whereas the reduction of losses due to geologic hazards is primarily a state and local responsibility. In San Mateo County, plans and programs designed for the protection of life and property are coordinated by the San Mateo County Office of Emergency Services.

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1977 to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program." To accomplish this, the Act established the National Earthquake Hazards Reduction Program (NEHRP). Congress reviewed and reauthorized this program in 2004.

NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The NEHRP designates the National Institute of Standards and Technology (NIST) as the lead agency of the program. As lead agency, it develops, evaluates, and tests earthquake resistant design and construction practices for implementation in the building codes

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[5] The damage level represents the estimated overall level of damage that will occur for various MM intensity levels. The damage, however, will not be uniform. Some structures will experience substantially more damage than this overall level, and others will experience substantially less damage. Not all structures perform identically in an earthquake. The age, material, type, method of construction, size, and shape of a structure all affect its performance.

and engineering practice. Under NEHRP, the Federal Emergency Management Agency (FEMA) is responsible for developing earthquake risk reduction tools and promoting their implementation, as well as supporting the development of disaster-resistant building codes and standards. USGS monitors seismic activity, provides earthquake hazard assessments, and conducts and supports targeted research on earthquake causes and effects. Programs under NEHRP help inform and guide planning and building code requirements such as emergency evacuation responsibilities and seismic code standards.

Disaster Mitigation Act of 2000

The Disaster Mitigation Act of 2000 (DMA2K) (Public Law 106-390) amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 to establish a Pre-Disaster Mitigation (PDM) program and new requirements for the federal post-disaster Hazard Mitigation Grant Program (HMGP). DMA2K encourages and rewards local and state pre-disaster planning. It promotes sustainability and seeks to integrate state and local planning with an overall goal of strengthening statewide hazard mitigation. This enhanced planning approach enables local, tribal, and state governments to identify specific strategies for reducing probable impacts of natural hazards such as floods, fire, and earthquakes. In order to be eligible for hazard mitigation funding after November 1, 2004, local governments are required to develop a Hazard Mitigation Plan that incorporates specific program elements of the DMA2K law. In the Bay Area, the Association of Bay Area Governments (ABAG) has adopted a multi-jurisdictional FEMA-approved 2010 Local Hazard Mitigation Plan Update, which cities and counties can adopt and use, in full or in part, in lieu of preparing all or part of a Local Hazard Mitigation Plan themselves.[6]

State Regulations

California Multi-Hazard Mitigation Plan

The State of California Multi-Hazard Mitigation Plan, also known as the State Hazard Mitigation Plan (SHMP), was approved by FEMA in 2013. The SHMP outlines present and planned activities to address natural hazards. The adoption of the SHMP qualifies the State of California for federal funds in the event of a disaster. The SHMP provides goals and strategies which address minimization of risks associated with natural hazards and response to disaster situations. The SHMP notes that the primary sources of losses in the State of California are fire and flooding.

Alquist-Priolo Earthquake Fault Zoning Act (1972)

The Alquist–Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures used for human occupancy. The main purpose of the law is to prevent the construction of buildings used for human occupancy on top of active faults. The law only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards, such as groundshaking or landslides.

The law requires the State Geologist to establish regulatory zones (known as Earthquake Fault Zones or Alquist–Priolo Zones) around the surface traces of active faults, and to issue appropriate maps. The maps are then distributed to all affected cities, counties and State agencies for their use

[6] Multi-Jurisdictional Local Hazard Mitigation Plan for the San Francisco Bay Area, ABAG 2010, http://quake.abag.ca.gov/wp-content/documents/ThePlan-Chapters-Intro.pdf

in planning and controlling new or renewed construction. Generally, construction within 50 feet of an active fault zone is prohibited. As discussed below, the California Geological Survey does not identify Belmont on its list of cities affected by Alquist–Priolo Earthquake Fault Zones.

Hospital Facilities Seismic Safety Act of 1973

The Alfred E. Alquist Hospital Facilities Seismic Safety Act (HSSA) was passed in 1973 to ensure that hospitals in California conform to high construction standards and are reasonably capable of providing services to the public after a disaster. The HSSA requires the establishment of rigorous seismic design regulations for hospital buildings and requires that new hospitals and additions to hospitals have the capacity, as far as is practical, to remain functional after a major earthquake. State law requires that all existing hospital buildings providing general acute care as licensed under provisions of Section 1250 of the California Health and Safety Code be in compliance with the intent of the HSSA by the year 2030. There are no hospitals subject to the HSSA in the City of Belmont or in the Planning Area.

Seismic Hazards Mapping Act, California Public Resources Code Sections 2690–2699.6

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong groundshaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a Seismic Hazard Zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. Geotechnical investigations conducted within Seismic Hazard Zones must incorporate standards specified by the California Geologic Society (CGS) Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards.[7] There are no Seismic Hazard Zones in the Planning Area; the Alquist Priolo Zone along the San Andreas is in the vicinity, but is outside of the Planning Area to the southwest.[8]

California Building Standards Code

The California Building Standards Commission is responsible for coordinating, managing, adopting, and approving building codes in California. The State of California provides minimum standards for building design through the California Building Standards Code (CBC) (California Code of Regulations Title 24). Where no other building codes apply, Chapter 29 of the CBC regulates excavation, foundations, and retaining walls. The CBC applies to building design and construction in the State and is based on the Federal Uniform Building Code used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The CBC has been modified for California conditions with numerous more detailed or more stringent regulations.

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[7] California Geological Society (CGS). *Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards.* 1997.

[8] California Department of Conservation, Regulatory Maps for San Mateo Quadrangle. http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps

The state earthquake protection law (California Health and Safety Code Section 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. The CBC requires an evaluation of seismic design that falls into Categories A–F (where F requires the most earthquake-resistant design) for structures designed for a project site. The CBC philosophy focuses on "collapse prevention," meaning that structures are designed for prevention of collapse for the maximum level of groundshaking that could reasonably be expected to occur at a site. Chapter 16 of the CBC specifies exactly how each seismic design category is to be determined on a site-specific basis through the site-specific soil characteristics and proximity to potential seismic hazards.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls. This chapter regulates the preparation of a preliminary soil report, engineering geologic report, geotechnical report, and supplemental ground-response report. Chapter 18 also regulates analysis of expansive soils and the determination of the depth to groundwater table. For Seismic Design Category C, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading. For Seismic Design Categories D, E, and F, Chapter 18 requires these same analyses plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also requires mitigation measures to be considered in structural design. Mitigation measures may include ground stabilization, selection of appropriate foundation type and depths, selection of appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions. Peak ground acceleration must be determined from a site-specific study, the contents of which are specified in CBC Chapter 18.

Finally, Appendix Chapter J of the CBC regulates grading activities, including drainage and erosion control and construction on unstable soils, such as expansive soils and areas subject to liquefaction.

California Department of Transportation (Caltrans)

Jurisdiction of the California Department of Transportation (Caltrans) includes State and interstate routes within California. Any work within the right-of-way of a federal or State transportation corridor is subject to Caltrans regulations governing allowable actions and modifications to the right-of-way. Caltrans standards incorporate the California Building Code, and contain numerous rules and regulations to protect the public from seismic hazards such as surface fault rupture and groundshaking. In addition, Caltrans standards require that projects be constructed to minimize potential hazards associated with cut and fill operations, grading, slope instability, and expansive or corrosive soils, as described in the Caltrans Highway Design Manual (HDM).

National Pollution Discharge Elimination System Permits

In California, the State Water Resources Control Board (SWRCB) and its Regional Water Quality Control Board (RWQCB) administer the National Pollution Discharge Elimination System (NPDES) program. The NPDES permit system was established as part of the Federal Clean Water Act to regulate both point source discharges and non-point source discharges to surface water of the United States, including the discharge of soils eroded from construction sites.

The NPDES program consists of characterizing receiving water quality, identifying harmful constituents (including siltation), targeting potential sources of pollutants (including excavation and grading operations), and implementing a comprehensive stormwater management program. Construction and industrial activities typically are regulated under statewide general permits that are issued by the SWRCB. Additionally, the SWRCB issues Water Discharge Requirements that also serve as NPDES permits under the authority delegated to the RWQCBs, under the Clean Water Act. See Section 4.9 of this EIR, "Hydrology and Water Quality," for more information about the NPDES.

Regional and Local Regulations

City of Belmont General Plan

The 1982 Belmont General Plan contains a Seismic Safety/Safety Element that considers seismicity, geology, soils, and emergency management. Policies seek to investigate and mitigate geologic and seismic hazards, reduce exposure to geologic and seismic hazards, and increase effectiveness of response to emergencies. The General Plan Update (part of the Proposed Project) would replace the City's current General Plan.

City of Belmont Buildings Ordinance

The City of Belmont has a buildings ordinance (Municipal Code Chapter 7) that promotes public safety by identifying buildings in Belmont that exhibit structural deficiencies that could cause injury or loss of life due to seismic hazards. This Chapter also requires that geotechnical studies be completed prior to issuance of a building or grading permit for sites that are located in areas of potential seismic and geologic hazards, including sites at risk of expansive soils, moderate to low stability of cuts, fair to poor earthquake stability, fair to poor foundation conditions, and high susceptibility to landsliding. Any required geotechnical reports are reviewed by the City's building official and the City's geologist prior to issuance of a building or grading permit.

City of Belmont Grading Ordinance

The City of Belmont has a grading ordinance (Municipal Code Chapter 9) that promotes public safety by protecting property from erosion and ground movement, limiting the disturbance of natural terrain and vegetation to the minimum necessary to accommodate reasonable use of property, and encouraging site preparation which is harmonious with surrounding land.

City of Belmont Zoning Ordinance

The Belmont Zoning Ordinance, Section 4.7, establishes the Hillside Residential and Open Space (HRO) District, which addresses numerous risks to development on the city's hillsides. Objectives of the HRO District include minimizing flood hazards, runoff, and soil erosion incurred from development of hillsides; providing safe vehicular circulation; and minimizing exposure to wildland fire.

San Mateo County General Plan

The 1986 San Mateo County General Plan, which applies to unincorporated portions of the county, contains a Soil Resources chapter (Chapter 2) which provides policies to minimize soil erosion and prevent soil contamination. The Plan also includes a Natural Hazards chapter (Chapter 15) that aims to reduce the potential risk of death, injury, property damage, and economic and social dislocation resulting from earthquakes, landslides, and erosion. Policies seek to minimize potential risks through education, information provision, and emergency preparedness; protect people and property from natural and man-made disasters; minimize exposure to geologic and seismic hazards; and provide adequate emergency evacuation and access. Until such time as the unincorporated Harbor Industrial Area (the area in Belmont's Sphere of Influence) is annexed, this area is subject to the San Mateo County General Plan and Zoning Regulations.

San Mateo County Zoning Regulations

Chapter 19.5 in the San Mateo County Zoning Regulations includes provisions for a Geologic Hazard (GH) Overlay District. The GH district establishes investigation requirements for areas that are subject to potential geologic problems, including active faulting, landsliding, debris flow/mud flow, rock fall, and adverse soil conditions.

4.5.2 Impact Analysis

SIGNIFICANCE CRITERIA

Implementation of the proposed General Plan would have a potentially significant adverse impact if the Plan would:

Criterion 1: Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

- Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map or based on other substantial evidence of a known fault;
- Strong seismic groundshaking;
- Seismic-related ground failure, including liquefaction; or
- Landslides.

Criterion 2: Result in substantial soil erosion or topsoil loss;

Criterion 3: Locate structures on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;

Criterion 4: Locate structures on expansive soils, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property; or

Criterion 5: Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

METHODOLOGY AND ASSUMPTIONS

This evaluation of geologic and seismic hazard conditions was completed using published geologic, soils, and seismic maps and studies from USGS, CGS, ABAG, and NRCS. In order to reduce or mitigate potential hazards from earthquakes or other local geologic hazards, the Proposed Project ensures development will continue to be completed in compliance with local and State regulations. These regulations include the CBC, the Seismic Hazard Mapping Act, and the City of Belmont Municipal Code. Policies and implementation measures developed for the Proposed Project include continued conformance with these applicable local and State building regulations.

IMPACT SUMMARY

Future development under the Proposed Project could result in substantial adverse effects from seismic groundshaking, or seismic-related ground failure. However, as described below, the Proposed Project includes goals and policies that focus on geology, soil, and seismic safety. Furthermore, future development projects would be subject to State regulations and the California Building Code, ensuring that risks from seismic and geologic conditions are minimized. Implementation of these goals, policies, and regulations would ensure potential impacts would remain below a level of significance.

Moreover, the development contemplated by the Proposed Project's General Plan and BVSP may bring additional people and structures to the seismically active area; however, attracting people to a seismically active area does not, in and of itself, constitute a significant effect of the Proposed Project on the environment and therefore does not present a potential impact for purposes of analysis under CEQA unless the Proposed Project would exacerbate existing environmental hazards or conditions that already exist.[9]

IMPACTS AND MITIGATION MEASURES

Impact

4.5-1 Implementation of the Proposed Project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map or based on other substantial evidence of a known fault; strong seismic groundshaking; seismic-related ground failure, including liquefaction; and landslides. ***(Less than Significant)***

Impact of Proposed General Plan, Phase I Zoning, and Climate Action Plan

Fault Rupture

Belmont is located within the seismically active San Francisco Bay Area, an area where several faults and fault zones are considered active by the California Department of Conservation, Division of Mines and Geology. Alquist–Priolo Earthquake Fault Zones have been established for the majority of these faults and fault zones. The purpose of the Alquist–Priolo Earthquake Fault Zones is to prohibit the location of structures on the traces of active faults, thereby mitigating potential damage

[9] *See California Building Industry Association v. Bay Area Air Quality Management District (CBIA v. BAAQMD)* (2015) 62 Cal. 4th 369, 390.

due to fault surface rupture. According to the California Geological Survey, Belmont is not listed as being affected by an Alquist–Priolo Earthquake Fault Zone.[10] To the extent that an earthquake threatens Belmont, General Policy 6.1-8 requires that consideration of seismic and geologic hazards are considered early in the development process, and Policy 6.1-10 requires the City to identify structures that may be subject to damage from an earthquake and provide information on ways to rehabilitate the structures to improve safety. Potential adverse effects to people or structures from the rupture of a known earthquake fault would be minimized to the greatest extent feasible and are less than significant.

Groundshaking

According to modeling conducted by the US Geological Survey in conjunction with the California Geological Survey, the San Francisco Bay Area will likely experience at least one major earthquake (greater than moment magnitude 6.7) within the next 30 years. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the magnitude, the duration of shaking, and the characteristics of the underlying geologic materials. The potential for damage or loss during an earthquake of this magnitude could be substantial, especially in older structures and infrastructure that were constructed under less stringent building codes.

In general, groundshaking tends to be more severe in softer sediments such as alluvial deposits where surface waves can be amplified causing a longer duration of groundshaking compared to bedrock materials. Areas where bedrock is exposed or located at relatively shallow depth tend to experience surface waves from an earthquake as more of a sharp jolt, compared to other areas. In general, considering the close proximity to the San Andreas fault, all locations within the Planning Area could experience considerable groundshaking.

Development associated with the Proposed Project would be required to conform to the current seismic design provisions of the most current version of the California Building Code (CBC), to provide for the latest in earthquake safety and minimize losses from an earthquake. Policy 6.1-1 requires the enforcement of standards to meet current safety codes associated with seismic activity. The CBC contains the latest seismic safety requirements to resist groundshaking through modern construction techniques, which are periodically updated to reflect the most recent seismic research. In addition, proposed General Plan Policy 6.1-2 requires the regulation of development on sites that have a history or threat of seismic dangers; Policy 6.1-4 requires geotechnical site analysis for proposed development on certain sites; and Policy 6.1-5 requires geotechnical studies that address the potential for groundshaking. With implementation of these policies, which supplement the existing building code requirements, the potential impacts from groundshaking would be minimized to the greatest extent feasible and are less than significant.

Liquefaction

Liquefaction typically occurs in areas underlain with loose saturated cohesionless soils within the upper 50 feet of subsurface materials. These soils, when subjected to groundshaking, can lose their

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[10] California Geological Survey. 2007. "Fault-Rupture Hazard Zones in California: Alquist-Priolo Earthquake Fault Zones, Cities and Counties Affected by Alquist-Priolo Earthquake Fault Zones as of January 2010." Sacramento, California: California Department of Conservation, California Geological Survey. Accessed October 21, 2016. http://www.conservation.ca.gov/cgs/rghm/ap/Pages/affected.aspx.

strength as a result of the buildup of excess pore water pressure, causing them to behave closer to a liquefied state. As shown in Figure 4.5-1, locations within the Planning Area are considered prone to liquefaction hazards. Almost all of the area east of Highway 101 and some land west of Highway 101 along Chesterton Avenue is at risk of liquefaction due to the presence of soils that are often saturated or characteristic of wetlands. In addition, limited areas along the Belmont Creek are at risk. Damage from earthquake-induced ground failure associated with liquefaction could be high in buildings constructed on improperly engineered fills or saturated alluvial sediments that have not received adequate compaction or treatment in accordance with current building code requirements. Ground failure, including liquefaction, as a result of an earthquake could occur in the planning area depending on the underlying conditions including moisture content, relative size of soil particles, and density of subsurface materials within 50 feet of ground surface.

The impacts from ground failure, including liquefaction, from development of land uses associated with the proposed General Plan and Phase I Zoning would be addressed through site-specific geotechnical studies prepared in accordance with CBC requirements and standard industry practices. Subsequent development would be required to conform to the current seismic design provisions of the CBC to minimize losses from ground failure as a result of an earthquake. These future projects would also be required to adhere to General Plan policies, including Policy 6.1-3 which prohibits development at high or very high risk of liquefaction, and Policy 6.1-9 which requires real estate transactions to declare known or suspected geologic hazards, such as liquefaction. Policy 3.4-6 in the Circulation Element requires the location and design of new roadways to prevent erosion and minimize grading. Therefore, the potential impact related to seismically related ground-failure including liquefaction is less than significant.

Seismically Induced Landslides

Landslide-susceptible areas are primarily located in various areas of northwest Belmont, but there is one also large hazard area in southeast Belmont in the Sunnyslope neighborhood, as shown in Figure 4.5-1. Landslides may occur on slopes of 15 percent or less; however, the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges. Landslide-susceptible areas are characterized by steep slopes and downslope creep of surface materials.

The impacts from landslides on development of future land uses associated with the proposed General Plan and Phase I Zoning would be addressed through site-specific geotechnical studies prepared in accordance with CBC requirements and standard industry practices, which would specifically address landslide hazards located in landslide hazard areas. Development would conform to the current design provisions of the CBC to mitigate losses from landslides. Proposed developments would also adhere to the hillside development requirements contained in the proposed policies, including General Plan Policy 4.4-3 that requires clustered development in the hillside areas to limit exposure to steep slopes; Policy 5.2-1 that encourages that areas with steep slopes remain undeveloped; Policy 6.1-6 requires geotechnical studies to include analysis of erosion and make recommendations, as warranted; and Policy 6.1-11 that requires the City to support erosion prevention. In addition, the Phase I Zoning continues the existing regulations in the Hillside Residential and Open Space District to resist landslides through development standards based on the average slope of the site, as well as slope stabilization techniques. Therefore, the potential for adverse landslide impacts related to proposed changes from implementation of the General Plan and Phase I Zoning is considered less than significant.

The CAP does not have elements that are distinct from the overall Proposed Project as it relates to this impact.

As a result of implementation of the proposed General Plan policies as described above and listed below, the impact of the General Plan, Phase I Zoning, and CAP would be less than significant.

Impact of Belmont Village Specific Plan and Village Zoning

As explained above, Belmont, including the BVSP area, is not listed by the California Geological Survey as being affected by an Alquist-Priolo Earthquake Fault Zone, and the BVSP and associated zoning regulations does not have elements that are distinct from the overall Proposed Project as it relates to groundshaking. Figure 4.5-2 shows the liquefaction and landslide risks in the BVSP Area. The slopes and area around Belmont Creek have a very high risk of liquefaction, and the southwest edge of the BVSP Area has high landslide risk. In addition, the southwestern edge of the BVSP Area along Sixth Avenue and Hill Street is adjacent to areas with slopes of over 30 percent just outside of the BVSP Area.

The General Plan policies discussed above apply within the BVSP Area. As a result of implementation of the policies of the proposed General Plan as described above and listed below, the impact of the BVSP and associated zoning would be less than significant.

Proposed General Plan Policies that Would Reduce the Impact

Circulation Element

3.4-6 Locate, design, and landscape new roadways to preserve the beauty of the area, prevent erosion, and help shield residents from noise and air pollution. To the extent possible, retain trees and vegetative cover and minimize grading.

Parks, Recreation, and Open Space Element

4.4-3 Consistent with the San Juan Hills and Western Hills area plans, cluster development in the hillside areas of western Belmont in order to maintain contiguous habitat areas, minimize grading, and limit exposure to steep slopes and other sensitive areas.

Conservation Element

5.2-1 Encourage the retention of areas that are hazardous to public safety and welfare as undeveloped open space, including steep hillsides unsuitable for development as identified in area plans and other detailed geotechnical studies; hydrological areas of concern; areas of geological instability; and appropriate setback areas on either side of known active fault traces.

Safety Element

6.1-1 Continue to maintain and enforce appropriate standards to ensure new development is designed to meet current safety codes and requirements associated with seismic activity. Require public and private development to be located, designed, and constructed to minimize the risk of loss of life and injury in the event of a major earthquake or other natural disaster.

6.1-2 Continue to regulate development, including remodeling or structural rehabilitation, to ensure adequate mitigation of safety hazards on sites having a history or threat of seismic dangers, erosion, landslides, or shrink swell.

6.1-3 Prohibit development in areas at risk of landslides or high or very high liquefaction as shown in [Draft General Plan] Figure 6-1, or on slopes steeper than 30 percent, unless detailed site investigations ensure that risks can be reduced to acceptable levels and the structure will be protected for its expected life.

6.1-4 Continue to require geotechnical site analysis for proposed development on sites as specified in the Municipal Code, prior to allowing site development.

6.1-5 Geotechnical studies shall identify any geologic hazards affecting the proposed project site, any necessary mitigation measures, and a statement of the site's suitability for the proposed development and whether or not it will be safe from geologic hazard for its expected life. The study shall identify net developable areas, if any, based on landslide or groundshaking potential or erosion risk. Impacts from the development, such as those resulting from increased water runoff, shall also be determined. Such studies must be signed by a licensed Certified Engineering Geologist or Geotechnical Engineer and are subject to review and approval by City staff and/or contracted employees.

6.1-6 Require any geotechnical studies to include the study of expansive and creeping soils, as well as analysis of erosion, seismic, and other geotechnical hazards, and make recommendations, as warranted.

6.1-8 Ensure consideration of seismic and geologic hazards at the earliest possible point in the development process, preferably before comprehensive engineering work has commenced.

6.1-9 Require real estate transactions, development approval processes, and property titles to declare known or suspected seismic or geologic hazards on a property, including areas suspected of high or very high risk of liquefaction, shrink swell, or landslide.

6.1-10 Identify and catalogue structures that may be subject to serious structural damage in the event of a major earthquake, such as unreinforced masonry and soft story buildings, and provide information to property owners on ways to pay for rehabilitation of existing buildings.

6.1-11 Support erosion prevention of hillside areas at risk of landslide, as identified in [Draft General Plan] Figure 6-1, by revegetation or other acceptable methods.

Proposed Belmont Village Specific Plan Policies that Would Reduce the Impact

There are no policies in the Belmont Village Specific Plan that relate to this topic. General Plan policies also apply to the BVSP Area.

Proposed Climate Action Plan Measures that Would Reduce the Impact

There are no strategies in the Climate Action Plan that relate to this topic.

Mitigation Measures

None required.

Impact

4.5-2 Implementation of the Proposed Project would not result in substantial soil erosion or topsoil loss. ***(Less than Significant)***

Impact of Proposed General Plan, Phase I Zoning, and Climate Action Plan

Development associated with the proposed General Plan and Phase 1 Zoning would likely include earthwork activities that could expose soils to the effects of erosion or loss of topsoil. Once disturbed, either through removal of vegetation, asphalt, or an entire structure, stockpiled soils if not managed appropriately are left exposed to the effects of wind and water. As required by Chapter 9 of the Belmont Municipal Code, earthwork and ground-disturbing activities, unless below minimum requirements, require a grading permit, compliance with which minimizes erosion, and the City's grading permit requirements ensure that construction practices include measures to protect exposed soils such as limiting work to dry seasons, covering stockpiled soils and use of straw bales and silt fences to minimize offsite sedimentation.

In addition, development that disturbs more than one acre would be subject to compliance with a National Pollutant Discharge Elimination System (NPDES) permit, including the implementation of best management practices (BMPs), some of which are specifically implemented to reduce soil erosion or loss of topsoil, and the implementation of a storm water pollution prevention plan (SWPPP) through the local jurisdiction. BMPs that are required under a SWPPP include erosion prevention measures that have proven effective in limiting soil erosion and loss of topsoil. Generally, once construction is complete and exposed areas are revegetated or covered by buildings, asphalt, or concrete, the erosion hazard is substantially eliminated or reduced.

General Plan policies and the Phase I Zoning regulations would further reduce potential impacts of erosion. Policy 3.4-6 minimizes erosion from new roadways; Policies 6.1-5 and 6.1-6 require geotechnical studies to address the risk of erosion; Policy 6.1-2 requires the City to continue to regulate development to ensure adequate mitigation of erosion hazards; and Policy 6.1-11 requires the City to support erosion prevention through revegetation and other methods. Section 7A, Off-Street Parking and Loading in Commercial Mixed Use and Regional Commercial Districts in the Phase I Zoning requires cross-grades to be designed for slower stormwater flow, which will minimize erosion.

The CAP will not result in adverse effects on any soil erosion or topsoil loss. Any development as a result of the CAP's Smart Growth Policy (Measure TL1) and Complete Streets (Measure TL2), in addition to any renewable energy or energy-efficient installation as result of the CAP's Energy Measures, would be subject to the same building and hillside zoning regulations, Belmont grading ordinance, the CBC, and policies requiring geotechnical studies, among other policies listed below. These would keep development and installations related to the CAP from having a significant effect on soil erosion or topsoil loss.

As a result of implementation of the proposed General Plan policies, Phase I Zoning regulations, and existing state and local regulations as described above and listed below, the impact of the General Plan, Phase I Zoning, and CAP would be less than significant.

Impact of Belmont Village Specific Plan and Village Zoning

The General Plan Policies and Phase I Zoning discussed above apply within the BVSP Area, and the BVSP and the associated zoning regulations do not have elements that are distinct from the overall Proposed Project as it relates to this impact, except for BVSP Policy 6.1-1, which requires the design of storm drainage and flood control structures to minimize erosion.

As a result of implementation of the policies of the proposed General Plan, Phase I Zoning, BVSP, and existing state and local regulations as described above and listed below, the impact of the BVSP and associated zoning regulations would be less than significant.

Proposed General Plan that Would Reduce the Impact

Circulation Element

Policy 3.4-6, as listed under Impact 4.5-1 above.

Safety Element

Policies 6.1-2, 6.1-5, and 6.1-6, as listed under Impact 4.5-1 above.

Proposed Belmont Village Specific Plan Policies that Would Reduce the Impact

Environmental Sustainability, Health, and Safety Chapter

6.1-1 Design storm drainage and flood control structures to minimize erosion and creek sedimentation and to preserve and enhance the wildlife habitat and vegetation of Belmont Creek.

Proposed Climate Action Plan Measures that Would Reduce the Impact

There are no strategies in the Climate Action Plan that relate to this topic.

Mitigation Measures

None required.

Impact

4.5-3 Implementation of the Proposed Project would not locate structures on expansive soils or on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse and create substantial risks to life or property. ***(Less than Significant)***

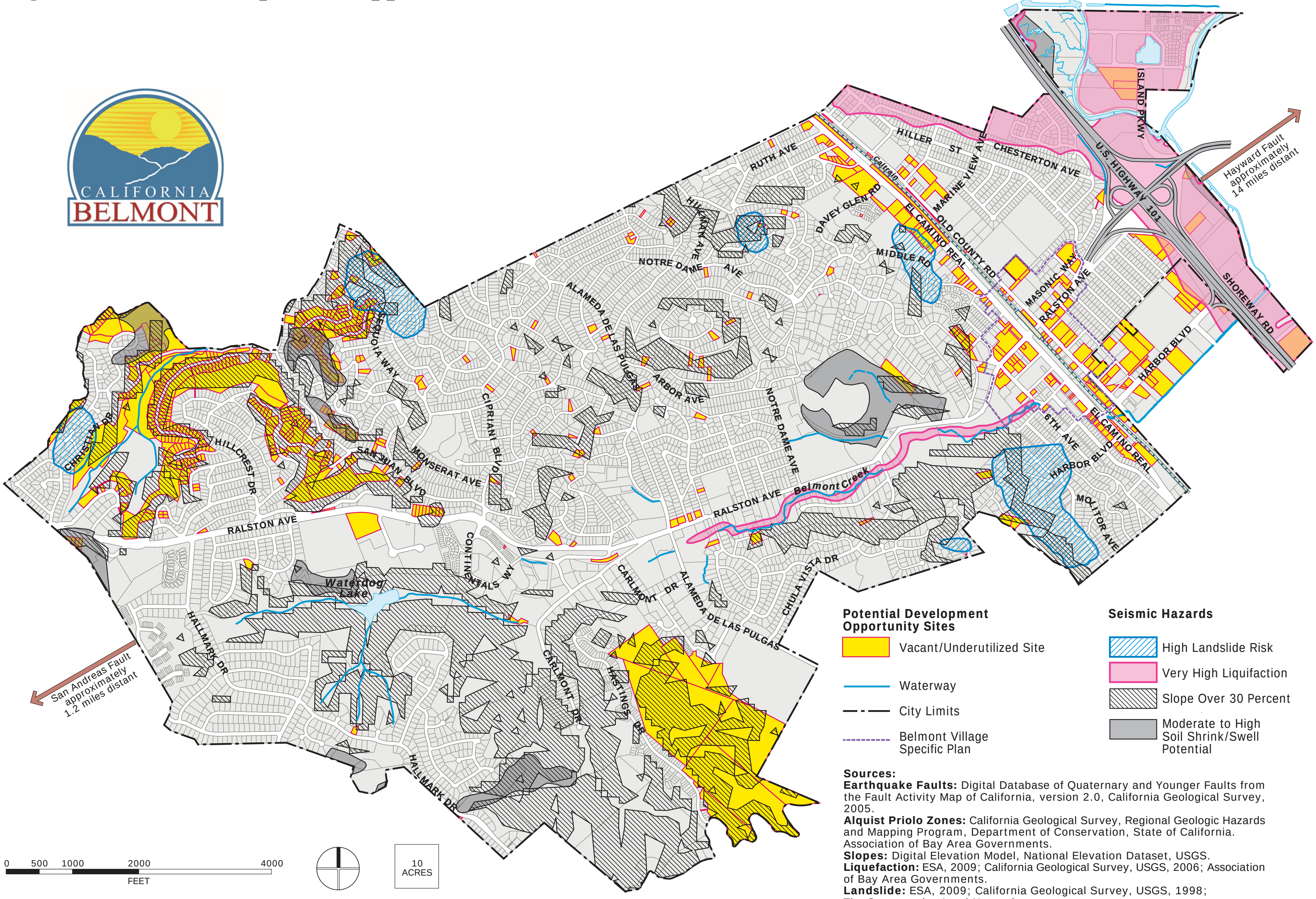
Impact of Proposed General Plan, Phase I Zoning, and Climate Action Plan

Some improvements associated with implementation of the proposed General Plan and Phase I Zoning could be located on geologic units or soils that are unstable, or that could become unstable and result in geologic hazards if not addressed appropriately. Areas with underlying materials that include undocumented fills, soft compressible deposits, or loose debris could be inadequate to support development, especially multi-story buildings. Soils that exhibit expansive properties when exposed to varying moisture content over time could result in damage to foundations, walls, or other improvements. Structures, including residential units and commercial buildings, could be damaged as a result of a settlement or differential settlement where structures are underlain by materials of varying engineering characteristics. Construction of new structures in the vicinity of relatively steep slopes could provide additional loading and contribute to landslides or slope failure from unstable soils or geologic units. Slope failure can occur naturally through rainfall or seismic activity, or through earthwork and grading related activities. Figure 4.5-4 shows which opportunity sites are located near seismic hazards and might be areas of potential concern. As illustrated in Figure 4.5-4, there are two general areas of vacant and underutilized sites where the slope is greater than 30 percent: south and west of Carlmont High School and in the northwest of the Planning Area. Both of these areas are designated as Measure F Overlay, which is shown as a crosshatch pattern in Figure 3-4 in Chapter 3 of this EIR, "Project Description." Measure F, which was passed by Belmont voters in 2005, stipulates that any changes to the existing Hillside Residential and Open Space (HRO) Zoning Districts that would increase the maximum allowed density, as well as any rezoning of land from an HRO District to another district that allows increased development density, must be approved by Belmont voters.

The potential hazards of unstable soil or geologic units would be addressed largely through the integration of geotechnical information in the planning and design process for individual projects to determine the local soil suitability for specific projects in accordance with standard industry practices and state-provided requirements, such as CBC requirements which are used to minimize the risk associated with these hazards. Proposed General Plan Policy 6.1-4 requires geotechnical site analysis for certain sites; Policy 6.1-6 requires geotechnical investigations to evaluate site-specific geotechnical characteristics, including the study of expansive or creeping soils; and Policy 6.1-5 requires the geotechnical studies to propose mitigation measures, if necessary. These measures are enforced through compliance with the CBC to avoid or reduce hazards relating to unstable soils and slope failure. In addition, General Plan Policies 6.1-1 and 6.1-2 ensure the enforcement of safety standards for new development related to seismic activity, erosion, landslides, and shrink swell. As discussed in Impact 4.5-1, Policy 6.1-3 prevents development in areas at risk of landslides and liquefaction.

The CAP will not result in building on or creating unstable ground. Any development as a result of the CAP's Smart Growth Policy (Measure TL1) and Complete Streets (Measure TL2), in addition to any renewable energy or energy-efficient installation as result of the CAP's Energy Measures, would be subject to the same building and hillside zoning regulations, Belmont grading ordinance, the CBC, and policies requiring geotechnical studies, among other policies listed below. These would keep development and installations related to the CAP from occurring on unstable soils or causing a geologic unit to become unstable.

Figure 4.5-4: Development Opportunities and Seismic Hazards



Potential Development Opportunity Sites

- Vacant/Underutilized Site
- Waterway
- City Limits
- Belmont Village Specific Plan

Seismic Hazards

- High Landslide Risk
- Very High Liquifaction
- Slope Over 30 Percent
- Moderate to High Soil Shrink/Swell Potential

Sources:
Earthquake Faults: Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, version 2.0, California Geological Survey, 2005.
Alquist Priolo Zones: California Geological Survey, Regional Geologic Hazards and Mapping Program, Department of Conservation, State of California. Association of Bay Area Governments.
Slopes: Digital Elevation Model, National Elevation Dataset, USGS.
Liquefaction: ESA, 2009; California Geological Survey, USGS, 2006; Association of Bay Area Governments.
Landslide: ESA, 2009; California Geological Survey, USGS, 1998; The Conservation Land Network.
Soils: Soil Survey, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey.

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As a result of implementation of the proposed General Plan policies and existing state and local regulations as described above and listed below, the impact of the General Plan, Phase I Zoning, and CAP would be less than significant.

Impact of Belmont Village Specific Plan and Village Zoning

As discussed in Impact 4.5-1, the southwestern edge of the BVSP Area is adjacent to and includes areas with potential for landslides. The proposed General Plan Policies 6.1-1, 6.1-2, 6.1-3, 6.1-4, 6.1-5, and 6.1-6 would also apply in the BVSP Area, and minimize impacts related to development in this area.

As a result of implementation of the policies of the proposed General Plan, BVSP, and existing State and local regulations as described above and listed below, the impact of the BVSP and associated zoning regulations would be less than significant.

Proposed General Plan Policies that Would Reduce the Impact

Safety Element

Policies 6.1-1, 6.1-2, 6.1-3, 6.1-4, 6.1-5, and 6.1-6, as listed under Impact 4.5-1 above.

Proposed Belmont Village Specific Plan Policies that Would Reduce the Impact

There are no policies in the Belmont Village Specific Plan that relate to this topic. General Plan policies also apply to the BVSP Area.

Proposed Climate Action Plan Measures that Would Reduce the Impact

There are no strategies in the Climate Action Plan that relate to this topic.

Mitigation Measures

None required.

Impact

4.5-4 Implementation of the Proposed Project would not result in soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water. *(No Impact)*

Impact of Proposed General Plan, Phase I Zoning, and Climate Action Plan

Future development that may result from implementation of the proposed General Plan and Phase I Zoning would not require septic systems or other alternative waste water disposal systems. The City of Belmont Sewer Division oversees the collection and treatment of all wastewater. Proposed General Plan Policy 6.5-5 reinforces the City ordinance, mandating all new development be connected to the City's sewer system; accordingly, all proposed improvements would be tied into the existing wastewater collection, as City ordinance requires new development in Belmont to connect to the City's wastewater system.

The CAP does not have elements that are distinct from the overall Proposed Project as it relates to this impact.

Impact of Belmont Village Specific Plan and Village Zoning

The BVSP and the associated zoning regulations do not have elements that are distinct from the overall Proposed Project as it relates to this impact.

Proposed General Plan Policies that Would Reduce the Impact

Safety Element

6.5-5 Require all new development to be connected to the City's sewer system.

Proposed Belmont Village Specific Plan Policies that Would Reduce the Impact

There are no policies in the Belmont Village Specific Plan that relate to this topic. General Plan policies also apply to the BVSP area.

Proposed Climate Action Plan Measures that Would Reduce the Impact

There are no strategies in the Climate Action Plan that relate to this topic.

Mitigation Measures

None required.